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硫化物对污水处理厂硝化菌活性的抑制作用

Inhibitory effect of sulfide on nitrifying biomass activity in wastewater treatment plants

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中文摘要:

建于城市远郊区的污水处理厂由于长距离管道输送污水中通常含有一定浓度的硫化物。通过郊区和城区污水处理厂硝化菌最大比增长速率常数(μ_A)的测定和硫化物抑制实验研究了硫化物对硝化菌活性的影响。经测定,位于郊区的白龙港污水处理厂15、20和25℃下μ_A值分别为0.19 d^{-1}、0.50 d^{-1}和0.72 d^{-1},而15℃和20℃下位于市区的曲阳厂μ_A值分别为0.41 d^{-1}和0.80 d^{-1}。通过向曲阳厂污泥中加入硫化钠和氯化钠的实验发现,低浓度钠离子对硝化菌活性没有明显的抑制作用;而硫化物在曝气条件下直接与污泥接触对硝化菌活性几乎没有影响,但不曝气混合接触后再曝气则硝化菌μ_A值将下降50%左右。硫化物的抑制作用很可能是白龙港厂硝化菌μ_A值明显低于曲阳厂实测值和文献报道值的原因。

英文摘要:

The influent of wastewater treatment plants (WWTPs) located in exurban area usually contains a certain concentration of sulfide owing to the long pipeline transportation. The inhibitory impact of sulfide on nitrifying biomass was investigated by comparing the maximum specific growth rate constant (μ_A) of nitrifying biomass between urban and exurban WWTP, and conducting sulfide inhibition batch test. Determination results showed that μ_A values of the the Bailonggang WWTP in exurban area were 0.19 d^{-1}, 0.50 d^{-1} and 0.72 d^{-1}, respectively at 15℃, 20℃ and 25℃, while μ_A values of the Quyang WWTP in urban area were 0.41 d^{-1} and 0.80 d^{-1}, respectively at 15℃ and 20℃. Batch tests with addition of Na_2S and NaCl into activated sludge from the Quyang WWTP demonstrated that low-concentration Na^+ had insignificant inhibitory effect on the activity of nitrifying biomass. The obtained results also indicated that nitrifying biomass was insensitive to the presence of sulfide under aerated exposure, but was inhibited by sulfide under unaerated exposure with μ_A value decreased about 50%. The inhibitory impact of sulfide on nitrifying biomass is probably the main reason of significantly lower μ_A value of the Bailonggang WWTP than that of the Quyang WWTP and reported μ_A values.

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